

**REMARKS**

Review and reconsideration on the merits are requested.

Claims 1-4, 6-14 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. US 2002/0155682 to Shibata et al. The grounds for rejection remain the same as set forth in the previous Office Action.

In the Response to Arguments at pages 6-8 of the Office Action, the Examiner maintains that Shibata does disclose the invention substantially as claimed for improving the quality of an AlGa<sub>N</sub>-based epitaxial layer. In this regard, the Examiner cites paragraphs [0047], [0048] and [0065]-[0071] as disclosing a first nitride semiconductor layer (namely, the AlN base layer) having an Al content that is higher than that of the second nitride layer where  $x_1=0.1$  and the working examples. Further, Shibata was cited as disclosing that the lower Al composition ratio in the second nitride semiconductor layer, as compared with that in the first nitride semiconductor layer (the AlN base layer) can desirably reduce dislocation density, citing paragraphs [0047] and [0048]. The Examiner concludes that the Al composition ratio, along with the thickness for the first nitride semiconductor layer are art-recognized result-oriented parameters subject to routine experimentation and optimization.

In response, the upper limit for the Al content of the third nitride semiconductor layer has been restricted to 0.5, based on the description at page 13, lines 21-27 of the present specification. Entry of the amendment is respectfully requested as placing the application in condition for allowance.

The rejection should be withdrawn because Shibata does not disclose or suggest an Al content of the third nitride semiconductor layer of 0.5 or less as claimed in amended claim 1. Further, in view criticality of the Al content of the third nitride semiconductor layer for providing

the effects of the invention, discussed in further detail below, Applicants respectfully disagree that this parameter is subject to routine optimization.

As described on page 13, lines 21 to 27 of the specification, when the Al content of the third nitride semiconductor layer is 0.5 or less, the third nitride semiconductor layer may exhibit high crystallinity and low dislocation density. Further, when the Al content of the third nitride semiconductor layer is regulated to be higher than that of the second nitride semiconductor layer, the dislocation density of the third nitride semiconductor layer can be reduced (see page 13, lines 33 to 36 of the specification).

Namely, the present invention was completed by finding that when the Al content of the third nitride semiconductor layer is regulated to within the specific range, the dislocation density of the third nitride semiconductor layer can be reduced.

Shibata discloses that when each Al content of the first and second nitride semiconductor layers is regulated to a specified relation, the dislocation density of the third nitride semiconductor layer can be reduced (see paragraphs [0047] and [0048] of Shibata). However, Shibata does not describe the Al content of the third nitride semiconductor layer in detail. Of course, there is no description and no suggestion to the effect that when the Al content of the third nitride semiconductor layer is regulated to a prescribed range, the dislocation density of the third nitride semiconductor layer can be reduced.

As for the Al content of the third nitride semiconductor layer, Shibata only describes " $\text{Al}_{0.95}\text{Ga}_{0.05}\text{N}$ " in its working examples, which is larger than the upper limit specified in amended claim 1. Although the Al content of the third nitride semiconductor layer described in examples of Shibata is higher than that of the second nitride semiconductor layer apparently by happenstance, Shibata does not disclose or suggest the technical idea of the present invention of

regulating the Al content of the third nitride semiconductor layer to within the specified range in order to reduce the dislocation density of the third nitride semiconductor layer.

In view of the amendment to claims and the foregoing remarks, it is respectfully submitted that the present claims are patentable over Shibata, and withdrawal of the foregoing rejection is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-4, 6-14 and 16 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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